PANEL DISCUSSION

Challenges and Opportunities for the Next Generation of PAD Specialists

A discussion on training, subspecialization, practicing in an OBL versus a hospital, finding a mentor, and more.

Jun Li, MD
University Hospitals Harrington Heart and Vascular Institute
Cleveland, Ohio
jun.li@uhhospitals.org

Lorenzo Patrone, MD
Ospedale San Giovanni di Dio
ASL Toscana Centro
Florence, Italy
patropatronis@gmail.com

Michael C. Siah, MD
Assistant Professor
Department of Surgery
Director of Limb Salvage
UT Southwestern Medical Center
Dallas, Texas
michael.siah@utsouthwestern.edu

TRAINING AND SUBSPECIALIZATION

What are the core training needs for the next generation of peripheral artery disease (PAD) specialists?

Dr. Li: The first need is an understanding of vascular disease states and treatment options (including medical therapy and surgical and endovascular options). The second is facile knowledge of alternative access and endovascular treatment options for a multitude of disease states (chronic limb-threatening ischemia [CLTI], PAD, aortic, renal/mesenteric, carotid, venous disorders, and pulmonary embolism).

Dr. Patrone: I think it all comes down to three chapters: clinical, endovascular, and open skills. Clinical skills are especially vital. To master both endovascular and open procedures at a high level is a big plus, but I can also see space for endo-only or open-only specialists working in a truly multidisciplinary group.

Dr. Siah: Training the next generation of PAD specialists needs to focus on the natural history of PAD and the implications our clinical decisions will have on our patients. A thorough understanding of the medical therapies essential to getting our patients their best outcomes, the technical aspects of optimizing perfusion, and an understanding of foot and ankle surgery is crucial. The variety of specialties that go into the care of PAD patients highlights the complexity of these patients, as well as the simple fact that not one single group of physicians can unilaterally and comprehensively do the work of a team. The easiest way to codify this sort of approach would be through the proliferation of multidisciplinary limb salvage programs throughout the country.

What do you feel is most lacking in current fellowships and training programs for physicians who will specialize in treating PAD?

Dr. Siah: I think one of the glaring aspects of my training was the absence of an opportunity to see op-

erators who don't work in the hospital practice setting. In training, my exposure to office-based lab (OBL) cases often came on Thursday or Friday afternoons, as we'd occasionally receive transfers of a cold leg or an access site complication to the hospital. After having spent some time beyond training and broadening my horizons, I've seen the exceptional quality of work and dedication to patients that providers in the outpatient PAD setting can have. Additionally, the majority of patients with PAD are cared for predominantly in the ambulatory setting. I think exposure to this would go a long way in providing our future physicians with insight.

Dr. Li: I think we need more cross-training into interventions including aortic and superficial venous disease (and reasons for treating).

Dr. Patrone: I think that—generally speaking and at least in Europe—interventional radiologists are actually missing adequate clinical and/or medical training. This, together with some other political problems, affects their ability to recruit, manage, and follow up their patients as proper clinicians.

Both interventional radiologists and interventional cardiologists are often missing open surgical skills, which are still needed in the PAD space.

I personally think that vascular surgeons have the best training scheme on paper, allowing the young specialists to potentially cover all aspects of PAD (even minor or major amputations). As a downside, sometimes surgical trainees are not able to get enough exposure to endovascular procedures during their training and only the ones willing to sharpen their skills with post–Certificate of Completion of Training fellowships are able to get to a high endovascular level.

Do you imagine there will be increasing subspecialization? For example, newer physicians focusing their practices toward specific conditions like PAD only, regardless of their primary specialty background. How will this affect the way fellowships are designed and implemented?

Dr. Patrone: I think that PAD is and will be in the future the most frequent disease (together with superficial venous) in the vascular space. Techniques, devices, and even the mentality around limb salvage are constantly and quickly evolving. In my opinion, that means there will hopefully be more and more clinicians who will consider this subspecialization and potentially provide a better and more limb salvage–centered service to their patients. I think that the continuous knowledge-sharing coming from international collaborations, educational events, and dedicated proctoring will shape more and more high-level PAD specialists; due to the already mentioned high number of potentially complex patients (unlikely in the complex aortic space), more centers will be able to provide high-level training and mentoring, without the need for young clinicians to travel abroad.

Dr. Siah: For the most part, I think the most important characteristic of a trainee, irrespective of specialty, is for them to be able to enter the workforce and provide safe and evidenced-based care. I am fortunate enough to work in an environment where we have incredibly specialized providers; however, we all take call and we all work together, and each is capable of taking care of the wide range of vascular pathologies that trundle through our emergency room. As a result, I am proud to say I think our graduates are fantastic and well prepared to care for patients wherever they end up. That being said, practice patterns do naturally develop over time and clinical interests can be fostered and grow over time. While the subspecialization that occurs at present time will continue, I think it's a training program's primary mission to provide their trainees with a broad training as opposed to a hyperspecialized one.

Dr. Li: Yes, definitely! The breadth of disease states in venous as well as arterial spans too widely for one to practice with true expertise in these niche territories.

With recent focus on both the over- and under-utilization of PAD therapies, how should new operators find the appropriate balance?

Dr. Li: The right therapy for the right patient at the right time is an important tenant to live by. The need for proper reimbursement for operators based on disease complexity rather than therapy administered—which sometimes is inappropriate—is essential.

Dr. Siah: I think this is a really tough question. Although the body of evidence in the management of patients with CLTI has grown considerably, I think one often-overlooked consideration has been the patient and what they want. As a vascular surgeon, I am proud of my ability to discuss the nuances of bypass with and without vein with my patients, as well as offer them complex endovascular procedures. Often these conversations will help the patient, their family, and myself come to the best clinical decision for their problem, and we come to that through the discussion of evidence, as well as addressing more practical concerns regarding wound healing, time in the hospital, time out

from work, etc. I don't think every practice and environment will be the same, but I think putting the patient first and appropriately addressing their expectations or misconceptions is critical in finding balance.

Dr. Patrone: I think that new operators need to put effort into reading papers fully, looking at data accurately and with a pinch of skepticism, without just stopping at what's written in the abstract or shared in a 5-minute sponsored presentation at an international congress. As in any other field, having clinical exposure to different operators and mentalities is very important to develop a balanced mentality. I like to stress that, as clinicians, we should run away from money-driven procedures that are clinically pointless for patients (eg, below-the-knee [BTK] vessel recanalization in patients affected by claudication); these should be considered disgraceful and be stigmatized.

MULTIDISCIPLINARY TEAMS

What are the essentials of assembling a comprehensive multidisciplinary PAD team? Who should be involved?

Dr. Patrone: When talking about CLTI patients, a podiatrist and a vascular surgeon should always be present (original toe-and-flow model). Other important members can be people who can bring unique skills to the table, like BTK-enthusiastic endovascular interventionalists (as most everyday CLTI patients are not good candidates for distal open surgery), dedicated foot surgeons (very rare on the market and providing an extremely valuable input, especially in complex patients), open-minded diabetologists/angiologists, precise microbiologists, experienced physiotherapists, and musculoskeletal radiologists. I think in the future we should consider a much bigger involvement of dieticians and clinical psychologists, the impact of whom is grossly underestimated.

Dr. Li: A comprehensive team must have endovascular, vascular surgery, vascular medicine, and wound care specialization (podiatry) for a successful program.

Dr. Siah: I think at minimum, you need two people: a foot and ankle surgeon and a vascular interventionalist. I think the "toe-and-flow" model intuitively makes sense—two individuals who work together to address the ischemia and infection. Beyond that, you can make a PAD team incredibly comprehensive. The utilization of nurse navigators, social workers, and liaisons that help facilitate follow-up and discharge planning needs to start immediately once these patients enter the hospital. Beyond that, other key hospital players such as internal medicine, vascular medicine, endocrinology, infectious disease, rheumatology, orthopedics, and plastic surgery—each of whom has the ability to optimize and improve the care of PAD patients—play a major role.

What do you see as the role of the PAD team in preventing progression to advanced CLTI?

Dr. Siah: One of the challenges in combating PAD is appropriate, early identification of these patients. While arterial noninvasive studies can identify patients with occlusive disease, delivering therapy purely based on these tests may lead to interventions on minimally symptomatic or even asymptomatic patients. Ultimately, this is not the solution if the goal is to prevent progression of PAD patients into CLTI patients. I think close collaboration among members within a CLTI team when patients initially present with wounds is very important, and prior to this, appropriately educating primary care physicians, podiatrists, and hospitalists about the best medical therapies is the best place for us to start.

Dr. Patrone: Much more needs to be done in prevention of CLTI. Effort should be put into promoting much more aggressive awareness campaigns, not only in the community but also focused on general practitioners/diabetologists; they are the ones who need to work on better control of risk factors, such as sugar level control and smoking cessation. Diabetic patients (and their families) should be better educated by clinicians, both before and after having developed an ulcer. We know that roughly 40% of patients have a recurrence within 1 year after ulcer healing, almost 60% within 3 years, and 65% within 5 years.[1] Prevention of foot ulcer recurrence requires good diabetes control, ongoing professional foot care at intervals of 1 to 3 months, and properly fitting footwear that has a demonstrated effect on the relief of plantar pressure.

Dr. Li: The first point of care needs to be podiatry because podiatrists are essentially primary care physicians in the realm of CLTI. The proper triage into further vascular evaluation stands with them, as they are often the first providers who see patients with wounds.

What can PAD specialists contribute in terms of increasing public awareness and screening for early detection?

Dr. Li: Ongoing education of the public is important—and not just only in September! Local screening

events can raise awareness for communities, especially in underserved areas.

Dr. Patrone: Interaction between clinicians who are directly or even indirectly involved in PAD management is crucial. A lot can be done on a local level by promoting our colleagues' awareness. On a higher level, scientific societies need to work better together, organizing shared campaigns (possibly working together with diabetes groups/societies, which are usually quite powerful) and trying to attract political interest from governments by creating mixed PAD/CLTI-focused parliamentary groups like in the United Kingdom.

Dr. Siah: Vascular surgery as a specialty has started to do a fantastic job in trying to raise awareness about PAD on a national level. Additionally, Drs. Fadi Saab, Craig Walker, and Pradeep Nair are in involved in the creation of a documentary about PAD. These types of strategies are important to provide insight to the public about the burden of disease and what we can do to help fight it.

As for early detection, I think this is really a double-edged sword. The natural history of PAD is such that the majority of patients will never and should never undergo an intervention. Most PAD patients will never have disabling symptoms or develop a wound. If we use screening test numbers to identify patients at risk, I think a lot of unnecessary interventions will be performed. I am a firm believer that interventions, particularly the placement of stents, fundamentally change the natural history of milder manifestations of PAD and potentially increase the risk of progression to CLTI and amputation. We need to remember and focus on the fact that we treat patients, not ankle-brachial index values. The clinical decisions we make can have profound implications on our patients' lives.

OFFICE-BASED VERSUS HOSPITAL-BASED SITE OF SERVICE

What do you see as the top three advantages and disadvantages of practicing in a hospital setting?

Dr. Siah: I have to declare my bias here to answer this question: I have never worked outside of a hospital setting. So, I would have to say, the best things about working in a hospital regarding PAD/CLTI patients are:

- **Multidisciplinary care:** We can manage infection, diabetes, and other comorbidities and perform revascularization procedures and foot/ankle surgery over the course of a couple days.
- **Centralization of care:** All the aforementioned components of care can be delivered and patients can be safely discharged to appropriate facilities
- **Opportunity to train:** The majority of training programs all use the hospital. This is where we train the future physicians of tomorrow about the technical aspects of PAD care, as well as how to work with other specialties to get the best outcomes for our patients.

The disadvantages come from the very nature of large hospitals and include:

- **Busy hospitals:** Sometimes getting to cases can be challenging due to the high volume of outpatient surgery on the books. Sometimes in order to treat patients, you have to be willing to do cases late into the night.
- **Turnover times:** At the end of the day, we are reliant on the entire health care system team to deliver care; sometimes, nonclinical aspects of care can affect the speed with which care is delivered.
- **Value analysis committees:** Just because a randomized clinical trial is performed doesn't necessarily mean you are allowed to bring a new technology into your armamentarium. Sometimes, despite the efficacy of a new technology, we have to wait for it to be validated by committees made up of people that may not truly "get" what we do on a day-to-day basis. These committees can be the gatekeepers to get a new therapy into the hospital, and it can take months sometimes for a new technology to get approved.

Dr. Li: The advantages of a hospital setting include providing advanced care, the ability to escalate therapy quickly, and multidisciplinary care, such as urgent minor amputation if needed. Disadvantages include the time spent waiting for procedures and to be seen.

Dr. Patrone: Advantages include the multidisciplinary approach, not being a money-driven practice, and having the possibility to treat medically complex patients. Disadvantages can include a difficult system to navigate, lack of resources, and little possibility to focus on PAD only.

And, in an OBL?

Dr. Li: Advantages of an OBL include increased accessibility and decreased time waiting for appointments/procedures. Disadvantages include potentially a lack of state-of-the-art technologies and the possible overuse of inappropriate technologies to improve revenue (which changes the income of the provider but not the outcome of the patient).

Dr. Siah: I'd perceive the advantages of working in the office-based setting to be:

- **Control:** You get to determine how your practice works, which cases you do and when you do them. You can also choose which technologies to have on hand, and your practice isn't dictated by administrators approving what you can and cannot use.
- **Speed and efficiency:** You can incentivize speed and efficiency and can run your practice extravagantly, bare-bones, or anywhere in between.

On the other hand, disadvantages of the office-based setting include:

- **Cost:** At the end of the day, you have to be very business and cost-savvy. Not only are you responsible for delivering care, you also have to know how much you are paying your staff, what your overhead is, and all the other aspects of running a business. It has always seemed challenging for me to divorce the cost of a procedure and the expected return on a case when working in this environment.
- **Access to clinical trials:** While this obviously has changed and many office-based facilities have been involved and been very successful in clinical trial work, historically, it has seemed that randomized controlled trials and investigational device exemption trials were preferentially performed in hospital settings.
- **Multiple trips to see multiple specialists:** If a patient has a wound, they may not be able to undergo combination cases with foot and ankle surgery and vascular interventionalists. This may limit the complexity of types of patients treated in these environments.

Dr. Patrone: Advantages to the OBL model include flexibility, a possibility to work with like-minded partners, and a friendlier environment. Disadvantages include a business-oriented working model, a lack of true everyday interaction with colleagues from other specialties, and an impossibility to take care of complex patients who require hospitalization.

What do you predict in terms of trends for each type of practice?

Dr. Patrone: Much depends on financial and social decisions made by politicians and big insurance companies. By not living or practicing in the United States, it's difficult for me to have a say, but I personally don't see the OBL practice continuing growing/booming as in the last 10 years. Having a successful practice relies a lot on the capacity to navigate an apparently very complex system, and it can be very stressful and possibly not worth it for the majority of the clinicians.

Dr. Siah: I think the burden of disease is increasing and the number of procedures, irrespective of place of practice, is going to increase. Ultimately, this is good because neither location has a monopoly on patients and the ability to deliver excellent care. However, I'd imagine there will be centralization in care for patients who require more expensive therapy to hospitals. This may include deep venous arterialization or percutaneous transmural arterial bypass, as those therapies are more expensive and reimbursement for those therapies continues to evolve.

Dr. Li: Likely, more OBLs will become commonplace. OBLs are moving toward partnering with podiatry practices, and this could possibly create a self-referring mechanism, which is plagued with biases and potentially questionable ethical practices.

OCCUPATIONAL HAZARDS: RADIATION AND MUSCULOSKELETAL

Do you think the next generation of PAD specialists will increase the emphasis placed on occupational safety, specifically radiation exposure and musculoskeletal protection? How can these long-term health concerns be better prioritized?

Dr. Li: Yes, it should start with the current generation of endovascular and interventional cardiologists. Awareness and recognition is the first step. The culture of being forced to take on unreasonable risk is not acceptable—we should all know our own limits and how to mitigate our own risks.

Dr. Siah: I think radiation safety is very important. While I've been at UT Southwestern, one of my partners, Dr. Melissa Kirkwood, has worked tirelessly to publish about the risks of radiation and strategies operators can employ to mitigate those risks. I think if you want longevity in your career and you want to perform procedures that utilize fluoroscopy, you absolutely have to prioritize radiation safety. Additionally, the use of surgical loupes and wearing lead can make this career physically taxing. Once you start waking up in the morning with back and neck pain, you become very conscious of what strategies you can employ to not be in pain. Unfortunately, as it did with me, I didn't appreciate stretching, doing yoga, and working out until I started developing symptoms. Take care of your back and neck before you have pain!

Dr. Patrone: Possibly yes, they will. I have to say that nowadays we have all the knowledge and the tools to protect ourselves appropriately from radiation, from any kind of protective screens in the lab to much lighter two-piece lead gowns. I think that to put all these measures in practice, changing the average mentality of the operators will be key in better prioritizing long-term health concerns.

Similarly, there has been increased focus on burnout in physician communities, including the specialties involved in vascular care. In your opinion, what strategies are most likely to have the desired effect? Which strategies, while well-intended, will instead be added pressure and time expenditure?

Dr. Patrone: I think that bureaucracy is growing exponentially day by day, with more and more focus on preventing/dealing with medical litigations. This paperwork burden is what, in my opinion, stresses the clinicians more, taking up important time and energy from their practice. This extra-clinical workload is difficult to shake off, but a better life-work balance can help in dealing with it. In addition to that, I think every clinician should focus on what they can do better: We are expected to be excellent plumbers, scientists, and educators (as I explored in an episode of the Backtable podcast[2]), but we are physically unable to excel in all those aspects. Let's try to group together, helping each other by sharing our frustrations and feelings. We are stronger together, and finding someone who understands our pain makes it lighter and easier to be carried.

Dr. Li: Decreasing the push to meet relative value unit requirements (throughput) to allow more paid time off. I personally would rather have less compensation and more time dedicated to nonclinical work and/or family.

Dr. Siah: I think managing a desire to develop a robust clinical practice and mitigating the risks of burnout is something I continue to struggle with. It's really hard to turn down patients and cases, especially when you're trying to establish yourself as a CLTI/PAD specialist. Often, this leads to adding on case after case, and routinely leaving the operating room after 21:00 or 22:00. Although this can be incredibly rewarding, I was reminded by my mentors that this type of practice is unsustainable in the long run. And it's true. I don't think mandatory online modules about burnout help in preventing burnout, but they are a reminder to give yourself grace and take the opportunity to revisit your personal and professional goals. I think by taking stock of what your true priorities are, and doing this relatively frequently, you can find the balance you need to find personal and professional happiness, and this doesn't look the same for everyone (and that's OK).

MENTORSHIP AND LEADERSHIP: WHAT TO LOOK FOR

What is your advice for how to find and collaborate with a strong mentor in PAD practice?

Dr. Patrone: Be enthusiastic, be curious, be bold. Be the younger version of the mentor of your dreams and focus on absorbing anything from them, asking all the questions that pass from your mind. Choose someone who is patient-minded and compassionate, the one who you would like to treat your mum or dad. Ask about how to deal with anything else in life that is not related to wire skills; a mentor needs to be much more than a lab geek because outside the lab there is so much more than the satisfaction of crossing a long chronic total occlusion.

Dr. Siah: I was very lucky as a medical student and resident to meet individuals who continue to play a huge part in my development. I still very frequently call people from where I trained to catch up and discuss challenging cases. What has been truly gratifying has been when one of my mentors comes to me for advice about a tough case!

Most physicians respond really well to interest—so if you have an interest in their practice and you demonstrate that interest, relationships form really naturally. Sometimes, as a young physician, you feel like reaching out could be placing a burden on those you reach out to, but at the end of the day, you've got very little to lose by making an effort.

As for collaboration, I have been so pleasantly surprised by how responsive interventionalists (cardiologists, interventional radiologists, and other vascular surgeons) have been to me, essentially "cold-calling" them or "sliding into" their direct messages with clinical questions or simply just to say hello and introduce myself. When I started performing deep venous arterialization procedures, there was no one locally who could share technical insights into how to perform the procedures, what to look for during completion arteriography, and how to follow those patients, and relying on published papers sometimes leaves out the key technical aspects of the procedures. Eventually, I summoned the courage to reach out to an Italian vascular surgeon, Dr. Bruno Migliara, after reading his papers on the PiPeR technique,[3] and his responsiveness and thoughtful advice helped me tremendously, even though we had never met!

Dr. Li: I think going to meetings and talking with other providers, especially fellows courses (in early career) is helpful. Word of mouth is the most important aspect of introduction to current endovascular practitioners.

How can new physicians build their peer networks?

Dr. Siah: I think reading papers, going to meetings, and putting yourself out there is key. Social media is a great tool to employ because it allows you to network

with leaders in a variety of fields from the comfort of your cell phone or home computer. At the same time, you have to remember that you have very little control over the perceptions other people will have over what you post or say. Using social media can also allow you to introduce yourself to people you admire and respect, and it can help sort of put you on the map. Relying on your industry partners for introductions to other physicians locally and nationally can also rapidly grow your network. And naturally, when it comes to PAD, be willing to tackle the toughest cases, the "no-option" patients, and the patients who have otherwise been told that they need a major amputation. Although these cases are the most challenging, finding success in these situations leads to the best outcomes for your patients and will help grow your reputation amongst your peers locally.

Dr. Li: Peer networks can be built and cultivated through the same ways as finding and collaborating with mentors—going to meetings and talking with other providers.

Dr. Patrone: Go to educational events, be the first one to enter the conference in the morning and the last one to leave the party in the night. Don't be shy: Talk, interact, share your opinion and your feelings, and show your weaknesses and failures. You will bond with people in a way that will last forever.

And don't forget about social media! Ask about other people's input in difficult cases more than showing off your successes. Be humble and ready to learn from your peers. Good luck! ■

1. Armstrong DG, Boulton AJM, Bus SA. Diabetic foot ulcers and their recurrence. N Engl J Med. 2017;376:2367-2375. doi: 10.1056/NEJMra1615439. PMID: 28614678
2. BackTable Vascular & Interventional. Plumbers, scientists & educators: is it possible to fit it all in? w/ Dr. Lorenzo Patrone | Ep. 249. Accessed August 12, 2024. https://www.youtube.com/watch?v=BYCwcMjqCgg
3. Migliara B, Cappellari TF. A novel technique to create an arteriovenous fistula during total percutaneous deep foot venous arterialisation using an IVUS guided catheter. Eur J Vasc Endovasc Surg. 2018;55:735. doi: 10.1016/j.ejvs.2018.02.031

Disclosures
Dr. Li: None.
Dr. Patrone: Consultant to Abbott, Asahi, Biotronik, Cook, Pathfinder Medical, Sentante, Shockwave, and Terumo.
Dr. Siah: None.